

## Summary of Current Agriculture Related Research Within California

February 23, 2006

### Livestock Research

Project Name/Description	Key Project Goals	Principal Investigator and Staff	Affiliation	Funding Source	Funding	Completion Date
Evaluating Dairy Process Emissions Using Flux Chambers	Using environmental flux chambers at a working dairy, evaluate relative emission levels of individual process including lagoons, flush lanes, and corrals.	C.E. Schmidt	Private Contractor	ARB, SJVUAPCD	\$50,000	Complete
Evaluating Dairy VFA and Other Emissions Using Flux Chambers - Part 2	Using environmental flux chambers at a working dairy, evaluate relative emission levels of individual process including lagoons, flush lanes, and corrals. Emissions to be tested included VFAs, amines, phenols, and other compounds using various analytical methods. Perform chamber VFA recovery study.	C.E. Schmidt T. Card	Private Contractor	ARB, SJVUAPCD, Dairy Industry	\$250,000	Mid 2006
Measuring Dairy Cow Emissions in an Environmental Chamber	Place cows into an environmentally controlled chamber and evaluate speciated VOC emissions emitted directly from cows and from fresh waste products.	F. Mitloehner R. Flocchini J. Peters	UC Davis	USEPA	\$75,000 EPA	Complete
Measuring Dairy Cow Emissions in an Environmental Chamber - Part 2	Place cows into an environmentally controlled chamber and evaluate speciated VFA and other emissions emitted directly from cows and from fresh waste products.	F. Mitloehner S. Trabue J. Koziel E. DePeters	UCD USDA-ARS Iowa State University UCD	ARB, SJVUAPCD	\$200,000	Mid 2006
Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions In the San Joaquin Valley	Project is designed to obtain data needed to better estimate baseline dairy emissions and to estimate the emission reductions achievable with available control technologies.	C. Krauter D. Goorahoo B. Goodrich M. Beene	CSU Fresno	ARB and possible matching funds from ARI	\$250,000 ARB \$250,000 ARI (tentative)	June 2008
Process-Based Farm Emission Model to Estimate Air Emissions from California Dairies (Project Under ARB Processing and Review - Not yet funded)	Using biological principles and engineering studies, develop a feed/waste stream process-based dairy farm emission model for VOC emissions.	R. Zhang F. Mitloehner A. Goldstein	UC Davis UC Berkeley	ARB	\$300,00	July 2008 (estimated)
Dairy Air Quality Monitoring of ROG and Ammonia in the Central Valley of California	Maintain staffing and supplies for field and laboratory work to continue the ARB funded ROG project until 2006	C. Krauter D. Goorahoo B. Goodrich M. Beene	CSU Fresno	CSU Agricultural Research Initiative	\$208,000 ARI to match ARB and SJVAPCD funding	January 2007
Evaluating Dairy Reactive Organic Gas Emissions	Chemically speciate TOG samples collected at dairies. Attempt to develop emission factors for dairies and some individually tested dairy processes.	C. Krauter D. Goorahoo B. Goodrich M. Beene	CSU Fresno	ARB, CSU Foundation	\$100,000 ARB About \$20,000 from other sources	December 2005

Project Name/Description	Key Project Goals	Principal Investigator and Staff	Affiliation	Funding Source	Funding	Completion Date
Evaluation of Dairy Emission Mitigation Practices	Evaluate dairy PM10, 2.5, VOC, and ammonia emission mitigation practices for potential effectiveness. Includes lagoon and corral areas.	F. Mitloehner R. Zhang P. Robinson J. Fadel	UC Davis	Merced County via SWRCB	\$600,000	December 2006
Covered Lagoon Digester Emission Measurements	Measurements of NH3, methane, and VOCs at dairies with CEC funded dairy digester installations.	TBD	TBD	CEC	\$500,000	RFP out for response; project completion 2008.
Agricultural sources of PM10 and ozone precursors	Compile PM10 and NH3 emission factors. Measure concentrations of VOC relevant to to ozone formation upwind and downwind of dairies	R. Flocchini C. Parnell R. Higashi	UC Davis and Texas A&M	USDA	\$374,145	July 2006
Developing a Process Based Model for GHG for California Dairies	Using biological principles and mass balance, develop a cradle-to-grave emissions model to provide greenhouse gas emissions estimates for dairies.	W. Salas F. Mitloehner R. Zhang	Applied Geosolutions UC Davis	CEC	\$500,000	June 2007
Development of a Process-Based Ammonia Model for Livestock Sources	Develop a process-based model of ammonia emissions from five types of animal feeding operations: dairy, beef, swine, chicken, and turkey.	G. Tonnesen Z. Wang R. Zhang J. Fadel G. Mansell J. Haasbeek	UC Riverside UC Davis ENVIRON International Corporation	LADCO Lake Michigan Air Directors Consortium	\$250,000	Complete
Measuring Broiler Emissions in Tunnel Ventilated Housing	Measure PM10, ammonia, and speciated TOG emissions emitted from a tunnel ventilated broiler house during various stages of bird growth.	M. Summers D. Duke	CDFA Foster Farms	California Poultry Federation	\$40,000	Complete

## Pesticide Research

Project Name/Description	Key Project Goals	Principal Investigator and Staff	Affiliation	Funding Source	Funding	Completion Date
Reducing Emissions of Volatile Organic Compounds from Agricultural Soil Fumigation	Provide information that can be used to determine if proposed methods to control VOC emissions are adequate to achieve required reductions. Pesticides for testing include 1,3-D and metam	S. Yates J. Gan, M. Majewski D. Wang, Q. Wang, W. Zheng	UC Riverside	ARB	\$200,000	Dec-07
Extension to: Reducing Emissions of Volatile Organic Compounds from Agricultural Soil Fumigation	Provide information that can be used to determine if proposed methods to control VOC emissions are adequate to achieve required reductions.	S. Yates J. Gan, M. Majewski D. Wang, Q. Wang, W. Zheng	UC Riverside	ARB	\$100,000	Follow-on work starting in 2007 to continue with first phase effort.
Investigation of Atmospheric Ozone Impacts of Selected Pesticides	Develop methods for estimating and quantifying ozone impacts for selected pesticide compounds for which such estimates are not currently available. Measures reactivity in lab setting (smog chamber) for 1,3-D, EPTC, MITC.	W. Carter	UC Riverside	ARB	\$100,000	Summer 2006
Agricultural Pesticide VOC Sources and their Photochemical Ozone Formation Potential	Improve current understanding of the photochemical $\text{tO}_3$ formation potential of VOCs from agricultural pesticide applications in the San Joaquin Valley.	R. Higashi R. Flocchini M. Kleeman P. Green	UC Davis	USDA	\$400,000	Jun-07
Reductions of fumigant emissions using irrigation and Virtually Impermeable Films (VIF)	Reductions of fumigant emissions using irrigation and Virtually Impermeable Films (VIF) for 1,3-D, chloropicrin.	Tom Trout	CDFA	?	?	Fieldwork in progress
Reductions of fumigant emissions using irrigation	Evaluation of reductions in fumigant emissions using irrigation. Focus on Metam	Husein Ajwa	UC	UC	?	Funding approved but work not initiated.
Reductions of fumigant emissions using multi layered tarp	Evaluation of reductions in fumigant emissions using tarps. Focus on 1,3-D.	Husein Ajwa	UC	UC	?	Fieldwork in progress
Reductions of fumigant emissions using irrigation and Virtually Impermeable Films (VIF)	Reductions of fumigant emissions using irrigation and Virtually Impermeable Films (VIF) for 1,3-D, chloropicrin, methyl bromide.	Steve Fennimore	UC	UC	?	Fieldwork in progress
Commercialization of Intermittent Water Sealing	Identify optimal water management strategies for water sealing commercial-scale application of fumigants. Focus on MITC.	D. Sullivan H. Ajwa J. Radewald	Sullivan Environmental Consulting	USDA	\$78,000	2005
Reductions of Fumigant Related to Strawberry Cultivation	Identify reductins of fumigant related to strawberry cultivation	TBD	TBD	Strawberry Commission	\$500,000	RFPs released in 9/2005 and now being reviewed.

## On-Field Research

Project Name/Description	Key Project Goals	Principal Investigator and Staff	Affiliation	Funding Source	Funding	Completion Date
Improvement of PM10 emission factors for almond harvesting	Refine existing almond harvest particulate matter emissions.	R. Flocchini C. Parnell	UC Davis Texas A&M	Almond Board of California		June 2004
Improved Statewide Estimates of Ammonia Emissions from Native Soils in California	Develop California specific ammonia emission factors and modeling for native soils within California	C. Krauter C. Potter S. Klooster	CSU Fresno NASA Ames CSU Monterey	ARB	\$200,000	December 2005
Monitoring of Ammonia Emissions from Crop Production With a Tunable Diode Laser	Evaluate the use of a TDL system for the determination of ambient ammonia levels and ammonia emissions from specific agricultural operations.	C. Krauter D. Goorahoo B. Goodrich M. Beene	CSU Fresno	CSU Agricultural Research Initiative	\$296,000 ARI to match ARB and UniSearch funding	June 2005

## Summary of Completed Agriculture Related Research Within California

Project Name/Description	Key Project Goals	Principal Investigator and Staff	Affiliation	Funding Source	Funding	Completion Date
Interim Report Sources and Sinks of PM10 in the San Joaquin Valley, August 2001	Evaluate on-field PM10 emissions. Evaluate PM10 and ammonia emissions for feedlots and dairies.	R. Flocchini T. Cassel	UC Davis	USDA		August 2001
Statewide Inventory Estimates of Ammonia Emissions from Native Soils and Chemical Fertilizers in California	Measure and model ammonia emissions from agricultural fertilizer application and natural soils. Report available at: <a href="ftp://ftp.arb.ca.gov/carbis/reports/l522.pdf">ftp://ftp.arb.ca.gov/carbis/reports/l522.pdf</a>	C. Krauter C. Potter S. Klooster	CSU Fresno NASA Ames CSU Monterey	ARB	\$186,425	June 2001
Results of the Measurement of PM10 Precursor Compounds from Dairy Industry Livestock Waste	Using environmental flux chambers, evaluate dairy ammonia and ROG emissions. <a href="http://www.aqmd.gov/rules/proposed/pr1127.html">http://www.aqmd.gov/rules/proposed/pr1127.html</a>	C. Schmidt	Consultant	South Coast AQMD		June 1996
Results of the Measurement of Volatile Organic Compounds from Livestock Wastes	Evaluate process specific VOCs from dairies in the Sacramento region.	C. Schmidt	Consultant	U.S. EPA	\$25,000	January 1995
Survey Current Livestock Waste Management Practices in the South Coast Air Basin	Evaluate manure management practices in the SCAQMD <a href="http://www.aqmd.gov/rules/proposed/pr1127.html">http://www.aqmd.gov/rules/proposed/pr1127.html</a>	Egigian-Nichols	Tetra Tech Inc	South Coast AQMD		January 2002
Literature Survey and National Programs, Livestock Waste Management Practices Survey and Control Option Assessment	Literature survey of waste management and control options. <a href="http://www.aqmd.gov/rules/proposed/pr1127.html">http://www.aqmd.gov/rules/proposed/pr1127.html</a>	Egigian-Nichols	Tetra Tech Inc	South Coast AQMD		March 2003
Identify Potential Waste Management Practices Reducing Ammonia and VOCs, Livestock Waste Management Practices Survey and Control Option Assessment	Identify livestock practices to reduce emissions. <a href="http://www.aqmd.gov/rules/proposed/pr1127.html">http://www.aqmd.gov/rules/proposed/pr1127.html</a>	Egigian-Nichols	Tetra Tech Inc	South Coast AQMD		March 2003
Emissions of Particulate Matter and Ammonia from Cattle Feedyards and Dairies: a Texas-California Partnership	Quantify the effects of water application and manure harvest frequency on PM and NH3 emission from dry lots housing beef or dairy animals (heifers).	B. Auvermann W. Harman D. Meyer	Texas cooperative extension UC Davis	national center for manure and animal waste management		Dec-03

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